Appl. No. 09/943,699
Amdt. Dated Oct. 31, 2003
Reply to Office action of Sept. 2, 2003

Amendments to the Claims:

Claim 1 (currently amended) A laminated wear ring for a work piece polishing apparatus, the laminated wear ring comprising:

a toroidal shaped component formed of a high stiffness material and comprising a first substantially planar surface, an interior cylindrical surface and an outer cylindrical surface, the toroidal shaped component further comprising a first thickness adjacent the interior cylindrical surface having a first upper surface and a second thickness greater than the first thickness having a second upper surface adjacent the outer cylindrical surface, a portion of the first and second thicknesses measured in a direction perpendicular to the first substantially planar surface wherein less than a majority of a downward pressure on the laminated wear ring during a polishing process is applied to the first upper surface; and

a plastic laminate having first and second substantially parallel, substantially planar surfaces, the first substantially planar surface of the plastic laminate attached to the first substantially planar surface of the toroidal shaped component, the plastic laminate having a thickness measured between the first and second substantially parallel, substantially planar surfaces that is greater than the thickness of the work piece to be polished with the work piece polishing apparatus and less than [[about]] 1.5mm.

Claim 2 (original) The laminated wear ring of claim 1 wherein the high stiffness material comprises a stainless steel.

Claim 3 (original) The laminated wear ring of claim 1 wherein the plastic laminate further comprises an interior wall portion attached to the interior cylindrical surface.

Claim 4 (original) The laminated wear ring of claim 3 wherein the plastic laminate further comprises an exterior wall portion attached to the outer cylindrical surface.

Claim 5 (original) The laminated wear ring of claim 1 wherein the plastic laminate comprises polyetheretherketone (PEEK).

Claim 6 (currently amended) The laminated wear ring of claim 1 wherein the plastic laminate comprises [[Ertalyte TX]] polyethyleneterephthalate (PET) and polytetrafluoroethylene (PTFE).

Claim 7 (original) The laminated wear ring of claim 1 wherein the plastic laminate is attached to the first substantially planar surface of the toroidal shaped component using an adhesive.

Claim 8 (original) The laminated wear ring of claim 7 wherein the adhesive is selected from a group comprising rubberized epoxy; acrylic adhesive; and cyanoacrylate adhesive.

Claim 9 (original) The laminated wear ring of claim 1 wherein grooves are formed in the first substantially planar surface of the toroidal shaped component.

Claim 10 (currently amended) A laminated wear ring for a chemical mechanical planarization (CMP) apparatus for polishing a work piece, the laminated wear ring comprising:

a toroidal stainless steel component having a first substantially planar surface, an interior cylindrical surface and an exterior cylindrical surface, the component [[having]] including a first thickness having a first upper surface adjacent the interior cylindrical surface and a second thickness greater than the first thickness having a second upper surface adjacent the exterior cylindrical surface wherein less than a majority of a downward pressure applied on the laminated wear ring is applied to the first upper surface; and

a plastic laminate adhesively attached to the first substantially planar surface and a portion of the interior cylindrical surface, the plastic laminate having a thickness less than [[about]] 1.5mm.

Claim 11 (canceled) The laminated wear ring of claim 10 wherein the plastic laminate comprises a first substantially planar surface for attachment to the first surface of the stainless steel component and a second substantially planar surface parallel to the first substantially planar surface.

Claim 12 (original) The laminated wear ring of claim 11 wherein the portion of the plastic laminate adhesively attached to the portion of the interior cylindrical surface of the stainless steel component forms an exterior right angle with the first substantially planar surface.

Claim 13 (original) The laminated wear ring of claim 12 wherein the plastic laminate further comprises a second component for attachment to the exterior cylindrical surface of the stainless steel component, the second component coupled to and extending from the first substantially planar surface.

Claim 14 (currently amended) The laminated wear ring of claim 10 wherein the plastic laminate comprises [[Ertalyte TX]] polyethyleneterephthalate (PET) and polytetrafluoroethylene (PTFE).

Claim 15 (original) The laminated wear ring of claim 10, wherein the plastic laminate comprises polyetheretherketone (PEEK).

Claim 16 (original) The laminated wear ring of claim 10, wherein the plastic laminate is made from a material having a K-factor of not more than $100x10^{-10}$ in^3-min./lb.-ft.-hr.

Claim 17 (original) The laminated wear ring of claim 10, wherein the plastic laminate is made from a material having a K-factor of not more than $50x10^{-10}$ in^3-min./lb.-ft.-hr.

Claim 18 (original) The laminated wear ring of claim 10, wherein the plastic laminate is made from a material having a coefficient of friction of not more than 0.3.

Claim 19 (original) The laminated wear ring of claim 10, wherein the plastic laminate is made from a material having a coefficient of friction of not more than 0.2.

Claims 20 (canceled) A laminated wear ring for a chemical mechanical planarization (CMP) apparatus for polishing a work piece, the laminated wear ring comprising:

a toroidal stainless steel component having a first surface, an interior cylindrical surface and an exterior cylindrical surface; and

a plastic laminate adhesively attached to the first surface and a portion of the interior cylindrical surface, the plastic laminate made of a material with a K-factor of not more than $100x10^{-10}$ in^3-min./lb.-ft.-hr.

Claim 21 (canceled) The laminated wear ring of claim 20 wherein the plastic laminate is made of a material with a coefficient of friction of not more than 0.3.

Claim 22 (canceled) The laminated wear ring of claim 20 wherein the plastic laminate is adhesively attached to a portion of the exterior cylindrical surface of the toroidal stainless steel component.

I. CLAIM REJECTION UNDER 35 USC § 103

In paragraph 6 of the Office Action, Examiner rejects claims 1-7 and 10-15 under 35 USC § 103(a) as being unpatentable over Masuta (GB 2336121). Applicants have amended independent claims 1 and 10 to include the toroidal shaped component having a first upper surface and a second upper surface. The first upper surface corresponding to material of the toroidal shaped component of the first thickness which is adjacent to interior cylindrical surface. The second upper surface corresponding to material of the toroidal shaped component of the second thickness which is adjacent to the exterior cylindrical surface. The second thickness being greater than the first thickness.

Referring to FIG. 4 of Applicants disclosure, a laminate wear ring is illustrated. The laminate wear ring comprises a toroidal shaped component (130) that is formed of a high stiffness material and a plastic laminate (146). The thinner portion (142) is shown adjacent to the interior cylindrical wall (132) and the thick portion (140) adjacent to the exterior cylindrical wall (134). The toroidal shaped component has a lower surface that is substantially planar (136).

Applicants respectfully submit that Masuta neither teaches nor suggests a toroidal shaped component having a first thickness and a second thickness as recited in independent claims 1 and 10. Referring to FIG. 1B of Masuta shows a laminate wear ring 101 comprising an upper metal portion 101b and a resin portion 101a. Upper metal portion 101b has a uniform thickness and does not comprise a first and second thickness. Similarly, FIG. 3A of Masuta shows laminate wear ring 101 comprising a metal portion 301b and a resin portion 301a. In particular, resin portion 301a is shown having a region with some of the resin removed such that two surfaces are provided for contacting the polishing pad surface, one of which is offset

from the other. The metal portion 301b of Masuta has a uniform thickness and does not have two different thicknesses as recited in Applicants independent claims 1 and 10. Masuta neither teaches nor suggests modifying either metal portion 101b or 301b as taught and claimed by Applicants. Thus, Applicants respectfully submit that independent claims 1 and 10 distinguish over and are not obvious in view of Masuta.

In paragraph 7 of the Office Action, Examiner rejects claims 1-15 under 35 USC § 103(a) as being unpatentable over Zuniga et al (US 6,251,215). Applicants have amended claims 1 and 10 to further include that less than a majority of a downward pressure applied on the laminated wear ring is applied to the first upper surface. The first upper surface corresponds to the portion of the toroidal shaped component that is adjacent to the interior cylindrical wall having the first thickness. The portion of the toroidal shaped component of the first thickness is thinner than the portion of the second thickness. Referring to FIG. 4 of Applicants disclosure, the downward force on the laminate wear ring is shown being applied to the thick portion (140) of the toroidal shaped component as indicated by arrow 144. In particular, the text associated with arrow 144 states that the downward force is applied to thick portion (140) as indicated schematically by arrow 144 and conveyed to the thinner portion (142). Thus, in this embodiment, no force is applied to the portion of the toroidal shaped component of the first thickness (thinner portion).

Zuniga et al teaches the opposite, placing a majority of the force on a thinner portion of the annular upper portion (184) of the retaining ring (110). Referring to FIG. 2 of Zuniga et al, a retaining ring (110) comprises an annular upper portion (184) and an annular lower portion (180). The annular upper portion (184) is a metal ring and the lower annular portion (180) is a plastic ring. The annular upper portion (184) is glued (186) to the lower annular portion (180).

As shown, the downward force is applied by a base (104) that couples to the entire upper surface of the annular upper portion (184) which includes a thick section and a thin section. The downward pressure is also used to clamp a diaphragm between the base (104) and the thin section of the annular upper portion (184). As shown, the thin section of the annual upper portion (184) has more surface area coupling to base (104) than the thick section. Thus, the majority of the downward force is applied to the thin section. In other words, Zuniga et al teaches the opposite or away from Applicants claimed invention where less than the majority of the downward force is applied to thin section of Applicants toroidal shaped component.

Therefore, Applicant's amended independent claims 1 and 10 is believed to distinguish over and is unobvious in view of Zuniga et al.. Dependent claims 1-9 and 12-19 are respectively believed to properly depend from claims 1 and 10 and are believed allowable therewith.

II. CLAIM REJECTION UNDER 35 USC § 112

The Examiner states that claims 1-19 are rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Examiner states that the term "less than about" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Applicants have amended claims 1 and 10 to remove the word "about". Therefore, it is respectfully submitted that claims 1-19 satisfy the requirements of 35 U.S.C. § 112.